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THE APUS SUPERNOVA SEARCH PROGRAM: A SCIENTIFIC LEADERSHIP AND RESEARCH OPPORTUNITY FOR GRADUATE AND UNDERGRADUATE STUDENTS.

Abstract

Providing hands-on learning experiences for students in space-related education programs is a challenge and particularly so for programs that are offered 100% online. American Public University System offers Bachelor of Science and Master of Science degree programs in Space Studies that are delivered completely online. To date, 559 graduate students and 405 undergraduate students from around the globe have completed degrees since the inception of our program. In this paper we share our experience with offering these online degree programs and report on student success and the incorporation of hands-on learning activities. The unique aspect of our program is its emphasis on the use of astronomical observations to provide opportunities for graduate students to develop instrumentation for their research and to provide authentic research opportunities for undergraduate students. APUS operates a 24-inch Planewave CDK24 robotic telescope fitted with a SBIG STX-16803 CCD camera, located in Charles Town, WV. This instrument is an integral component of the undergraduate and graduate education in space studies that we provide. Currently we use this instrument in a supernova search program where graduate students image several dozen galaxies at a time in a periodic survey of the sky. Undergraduate students then compare the observations to reference images using blink-comparison software. This program is an excellent research opportunity for space studies graduate students as part of their master's capstone course. Graduate students research, design, and test components of the supernova search program; under faculty direction, they take a lead role in evaluating software, imaging the galaxies using the APUS telescope, and calibrating the images. The data is then supplied to students enrolled in undergraduate courses within our astronomy concentration as an extracurricular activity through the APUS chapter of the international "Students for the Exploration and Development of Space" (SEDS) organization. The undergraduate students analyze and study the images as they search for possible supernova events. This opportunity supports their classroom learning and provides a means for undergraduate students to participate in meaningful scientific research. Currently, 26 galaxies near the constellation of Pegasus are imaged regularly; this will be expanded into 156 galaxies in six different regions of the sky by Summer 2019.